

## **REMARKS**

Reconsideration of the present application is respectfully requested. Claims 1-6, 8-25, 27-31, 45, 46, 48-65, 72-77, 79, 80, 82, and 83 were previously withdrawn and claims 7, 26, and 39 were previously canceled. Claims 32 and 81 are amended herein, and all other claims are either in original form or have been previously presented so that claims 32-38, 40-44, 47, 66-71, 78, 81, and 84 are presently pending for examination on the merits, of which claims 32 and 81 are in independent form.

In the Office Action mailed September 9, 2008, the Examiner rejects independent claims 32 and 81 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,292,783 to Buchanan et al. (hereinafter Buchanan). For at least the reasons given below, Applicants submit that independent claims 32 and 81 are not obvious over the prior art, including Buchanan.

Each of independent claims 32 and 81 recites the limitation of “an inherent viscosity of from 0.05 to 0.12 dL/g.” The Examiner acknowledges that Buchanan fails to expressly disclose this limitation, instead only disclosing a range of inherent viscosity for its cellulose esters having a lower end of about 0.2 dL/g. However, according to the Examiner, the term “about” permits some tolerances under *In re* Ayers. Additionally, the Examiner states that “a difference of about 0.08-0.09 dL/g in the inherent viscosity is not expected to change the properties of the composition. It has been held that a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties” (Office Action, p. 3, ll. 11-14).

Despite the Examiner's contention, Applicants submit that a decrease in the inherent viscosity (“IV”) to between 0.05 and 0.12 dL/g does in fact produce a cellulose ester having substantially different properties than a cellulose ester having an IV of about 0.2 dL/g. As evidence of this fact, Applicants are submitting herewith a declaration under 37 C.F.R. § 1.132 from Michael C. Shelton (hereinafter Shelton Declaration), who is an expert in the field of cellulose esters chemistry and the first-named inventor of the present application. The Shelton Declaration presents a data set

based on three samples presented in the original specification and two new samples prepared for this response. The two new samples were prepared in order to illustrate the substantial difference in properties a cellulose ester having an IV of 0.12 dL/g as compared to a cellulose ester having an IV of about 0.2 dL/g. Specifically, the two new samples prepared were cellulose mixed esters having respective IVs of 0.12 and 0.18 dL/g. These two samples were compared with three samples originally presented in Example 34 and Table 6A of the Specification. All five of these cellulose ester samples had similar acetyl and butyryl degrees of substitution. Their properties are summarized in Table 1 of the Shelton declaration, reproduced below:

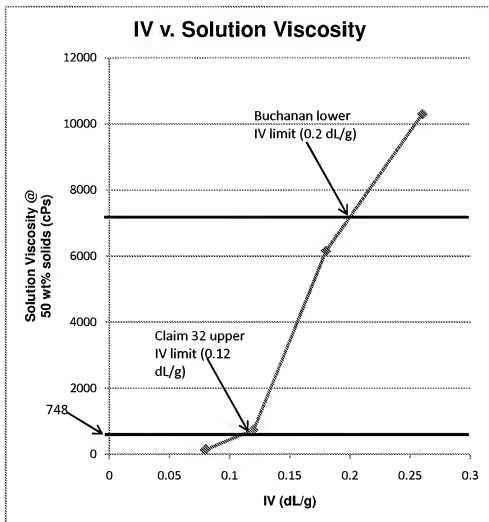
**Table 1**

Sample Number	Source	Butyryl DS	Acetyl DS	IV (dL/g)	Solution Viscosity @ 50% solids (cPs)
HS-CAB-55 EMT02-117	Table 6A	2.77*	0.19*	0.08	139.4
HS-CAB-55 EMT02-128	Table 6A	2.78*	0.18*	0.08	132.4
HS-CAB-55 EMT02-107	New	2.66	0.18	0.12	748
HS-CAB-55 EMT02-118	New	2.43	0.21	0.18	6,150
CAB-551-0.01	Table 6A	2.81*	0.09*	0.26	10,300

\* Calculated from original data; not presented in Table 6A

As discussed in the Shelton Declaration, a solution was prepared from each of the two new cellulose esters by dissolving 50 weight percent of the cellulose ester in a solvent of 90/10 n-butyl acetate/xylene in the same manner described in Example 34 of the Specification. Thereafter, the Brookfield viscosity of each solution was measured. The results from this analysis are listed in Table 1, above, and depicted visually in Graph 1, reproduced from the Shelton Declaration, below:

Graph 1



As shown in Graph 1, minor increases in cellulose ester IV cause very large increases in the viscosity of a high solids content (e.g., 50 weight percent) solution of the cellulose ester. According to the Shelton Declaration, “[m]aintaining a lower solution viscosity at higher solids content is important because it enables coating formulations to be prepared with a greater amount of solids and lower volatile organic compound content while maintaining workability” (Shelton Declaration, p. 3, ll. 3-5). Furthermore, the Shelton Declaration expounds on the difference between cellulose esters having an IV of 0.12 dL/g or lower and those having an IV of about 0.2 dL/g, stating that

"[c]ellulose ester compositions yielding higher solution viscosities, such as those that result from a high solids content solution using a cellulose ester with an IV of about 0.2 dL/g, are not suited for use in coating formulations because their high viscosities render them unworkable. However, cellulose esters having an IV of 0.12 dL/g or less are suited for use in high solid coating formulations because they provide a low viscosity, workable composition." (*Id.* at p. 3, ll. 5-9 to p. 4, ll. 1-2). Accordingly, cellulose esters having an IV of 0.12 dL/g or less possess significantly different properties than cellulose esters having an IV of about 0.2 dL/g.

According to the foregoing, the evidence presented in the Shelton Declaration effectively invalidates the Examiner's position that one of skill in the art would expect a cellulose ester having an IV of about 0.2 dL/g to have the same properties as a cellulose ester having an IV in the range of from 0.05 to 0.12 dL/g. Thus, Applicants submit that the Examiner's reliance on *Titanium Metals* cannot support a *prima facie* case of obviousness for independent claims 32 and 81.

In addition, Applicants submit that one of skill in the art would not find it obvious to modify Buchanan to employ a cellulose ester having an IV of less than 0.2 dL/g. In support of this assertion, Applicants are submitting herewith a declaration under 37 C.F.R. § 1.132 by Charles M. Buchanan (hereinafter Buchanan Declaration), who is an expert in the field of cellulose esters chemistry and the first named inventor on the Buchanan patent. According to the Buchanan Declaration, lowering the IV of Buchanan's cellulose ester would render it unfit for its intended purpose. This is because the compositional blends of Buchanan require minimum levels of certain physical properties. These physical properties are imparted, at least in part, by the cellulose ester component of the blend. However, cellulose esters having an IV below 0.2 dL/g would not have a sufficiently high molecular weight to impart such required physical properties. For example, the Buchanan Declaration states that:

the compositional blends of the '783 patent require a certain tensile strength, flexural modulus, and elongation. If a cellulose ester having an IV below 0.2 dL/g were employed in the invention of the '783 patent, the resulting blends would not possess the required minimum levels of these

physical properties, rendering them unsuitable for their intended use. (Buchanan Declaration, p. 1, ll. 13-16 to p. 2, ll. 1-4).

According to the MPEP, “the proposed modification cannot render the prior art unsatisfactory for its intended purpose” (MPEP § 2143.01(V)). As is made clear by the above-quoted language from the Buchanan Declaration, modifying the cellulose ester described in Buchanan to have an IV lower than 0.2 dL/g would render it unfit for its intended purpose. Accordingly, the disclosure of Buchanan in combination with the Examiner’s proposed modification fails to establish a *prima facie* case of obviousness for independent claims 32 and 81.

As mentioned above, the Examiner states in the Office Action that the term “about” permits some tolerances under *In re Ayers*. However, as noted in Applicants’ response to the Office Action of January 25, 2008, the term “about” was deleted in regards to the recited IV range in independent claims 32 and 81. This amendment distinguishes the situation in *In re Ayers*, where *both* the claims and the prior art reference employed the term “about.” For instance, the Court in *In re Ayers* states that “[t]he term ‘about’ as used in the patent *and in the appealed claim* evidently permits of some tolerance” (154 F.2d 182, 185 (CCPA 1946) (emphasis added)). Accordingly, *In re Ayers* is not applicable, given that the Court in that case was relying on the fact that both the prior art *and* the claim contained the term “about.”

According to the foregoing, Applicants submit that Buchanan neither discloses, either expressly or inherently, nor renders obvious the limitation of “an inherent viscosity of from 0.05 to 0.12 dL/g,” as recited in independent claims 32 and 81.

In addition to the IV limitation discussed above, each of independent claims 32 and 81 recites a cellulose mixed ester having “a total degree of substitution per anhydroglucose unit of from 3.08 to about 3.50.” It should be noted that each of these claims has been amended to remove the term “about” preceding the number 3.08. As acknowledged by the Examiner, Buchanan fails to explicitly disclose a cellulose ester having a total degree of substitution per anhydroglucose unit (“AGU”) in the range of from 3.08 to about 3.5, instead only disclosing an upper limit of about 3.0. However, it is the Examiner’s position that Buchanan’s disclosure of a total degree of substitution

per AGU in the range of from about 1.7 to about 3.0 discloses the recited range under *In re* Ayers, 154 F.2d 182 (CCPA 1946), because “the term ‘about’ permits some tolerances” (Office Action, p. 3, l. 1).

Despite the Examiner’s contention, Applicants submit that the rationale expounded in *In re* Ayers fails to provide an adequate basis for concluding that the presently claimed total degree of substitution is disclosed by Buchanan. This is because the difference between a degree of substitution of 3.0 and 3.08 is actually quite substantial. This fact is apparent by recognizing the difference in physical characteristics of a cellulose ester required to effect such a change, which can be seen by examining Table 1 on page 25 of the Specification, reproduced below:

**Table 1. Effect of DS<sub>Max</sub> on DP**

DP	DS <sub>Max</sub>		DP	DS <sub>Max</sub>
1	5.00		16	3.13
2	4.00		17	3.12
3	3.67		18	3.11
4	3.50		19	3.11
5	3.40		20	3.10
6	3.33		21	3.10
7	3.29		22	3.09
8	3.25		23	3.09
9	3.22		24	3.08
10	3.20		25	3.08
11	3.18		50	3.04
12	3.17		75	3.03
13	3.15		100	3.02
14	3.14		134	3.01
15	3.13		401	3.00

As is apparent from Table 1, the change from a  $DS_{\max}$  of 3.0 to 3.08 requires a reduction in the degree of polymerization from 401 down to 25. This equates to nearly a 94 percent reduction in the cellulose ester's degree of polymerization. To put it another way, a decrease in the  $DS_{\max}$  from 3.08 to 3.0 would require an increase in the degree of polymerization of over 1,500 percent.

In order to further clarify the difference between the present invention and Buchanan, Applicants have amended independent claims 32 and 81 to remove the term "about" preceding the lower end of the range provided for total degree of substitution per AGU. This amendment further distinguishes the situation in *In re Ayers*, where, as discussed above, *both* the claims and the prior art reference employed the term "about." Therefore, Applicants submit that Buchanan should not be deemed to disclose a total degree of substitution per AGU in the range of from 3.08 to about 3.50, as recited in independent claims 32 and 81.

Furthermore, Applicants submit that the recited total degree of substitution range of from 3.08 to about 3.50 is not obvious over Buchanan, even in view of *Titanium Metals Corp. of America v. Banner*, 778 F.2d 772 (Fed. Cir. 1985) (hereinafter *Titanium Metals*). As noted by the Examiner, under *Titanium Metals*, "a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties" (Office Action, p. 3, ll. 12-14). While this may be true in some cases, the present case certainly does not fall within this category. As discussed above, while on its face a difference in total degree of substitution per AGU of from 3.0 to 3.08 may appear small, it is in fact vastly different. For instance, reducing the total degree of substitution per AGU from 3.08 to 3.0 requires a 16-fold increase in the cellulose ester's degree of polymerization.

Additionally, Buchanan provides evidence that one of skill in the art would not expect a cellulose ester having a higher degree of substitution per AGU to have the same properties. As demonstrated in the Examples section of Buchanan, cellulose esters having higher degrees of substitution are not biodegradable. For instance,

Buchanan states, in referring to its Examples titled "Biodegradation Studies," that "[a]s expected, the films with a higher degree of substitution exhibit greater resistance to microbial attack" (Buchanan, col. 44, ll. 24-26). Thus, one of skill in the art would *not* expect a cellulose mixed ester having a total degree of substitution per AGU in the range of from 3.08 to about 3.50 to have the same properties as a cellulose ester having a total degree of substitution per AGU ranging from about 1.7 to about 3.0, based on the teachings of Buchanan. Accordingly, no *prima facie* case of obviousness can be supported by the theory proffered by the Examiner under *Titanium Metals*.

In addition to the foregoing, Applicants submit that it would not be obvious to modify Buchanan to employ a cellulose mixed ester having a total degree of substitution per AGU of from 3.08 to about 3.50. This is because doing so would render Buchanan unsatisfactory for its intended purpose. As mentioned above, "the proposed modification cannot render the prior art unsatisfactory for its intended purpose" (§ 2143.01(V)).

As clearly indicated by Buchanan, one of its intended purposes is to prepare cellulose ester-containing materials that are biodegradable. For example, Buchanan states that "*the preferred barrier films of this invention*" are "[b]iodegradable materials" (Buchanan, col. 18, ll. 35-37 (emphasis added)). However, as discussed above, increasing the total degree of substitution per anhydroglucose unit decreases the biodegradability of a cellulose ester. As further evidence of this fact, Applicants have included herewith EXHIBIT A, which is an article titled "Biodegradation of Cellulose Esters: Composting of Cellulose Ester-Diluent Mixtures (Charles M. Buchanan et al., JOURNAL OF MACROMOLECULAR SCIENCE – PURE AND APPLIED CHEMISTRY, vol. 32, no. 4, pp. 683-697 (1995)). According to EXHIBIT A, it has generally been found that "as the DS [(degree of substitution)] of the CA [(cellulose acetate)] decreased, the rate of biodegradation increased" (*Id.* at p. 684). Furthermore, Fig. 1 and its corresponding discussion in EXHIBIT A provide experimental data showing that the opposing corollary (i.e., that if degree of substitution is increased, then the rate of biodegradation is decreased) is also true (*Id.* at p. 687). Thus, because increasing the total degree of substitution per anhydroglucose unit *decreases* the biodegradability of a cellulose ester,



modifying Buchanan in such a manner would render Buchanan unsatisfactory for its intended purpose. Thus, one of skill in the art would not be motivated to make such a modification.

According to the foregoing, Applicants submit that Buchanan fails to disclose, either expressly or inherently, each element of independent claims 32 and 81, and one of skill in the art would not find these missing limitations to be obvious. Therefore, Applicants submit that no *prima facie* case of obviousness has been established for independent claims 32 and 81 based on the teachings of Buchanan. Accordingly, Applicants respectfully request the rejection of independent claims 32 and 81 as being unpatentable over Buchanan be withdrawn.

In light of the foregoing, Applicants submit that independent claims 32 and 81 are in condition for allowance. Additionally, while claims 33-38, 40-44, 47, 66-71, 78, and 84, which depend from independent claim 32, each recites additional patentable features, these claims should also be in condition for allowance because they depend from a patentable independent claim (MPEP § 2143.03). Further, since claim 81 is generic to all pending claims, Applicants request rejoinder of all withdrawn claims and allowance of claims 1-6, 8-25, and 27-84.

In summary, Applicants believe the present Application to be in condition for allowance. Accordingly, the Examiner is respectfully requested to reconsider the rejections, enter the above Amendment, remove all rejections, and pass the application to issuance.

Respectfully submitted,

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